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(54) **Video taperecorder with television standards converter**

Videobandrekorder mit Fernsehnormwandler

Enregistreur à bande vidéo avec convertisseur de standards de télévision

(84) Designated Contracting States:
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EP-A- 0 076 047 **US-A- 4 283 736**
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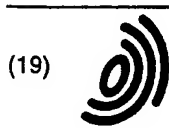
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• **PATENT ABSTRACTS OF JAPAN vol. 4, no. 152**
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• **EBU Review, No. 103, June 1967, pp 90-96, P.**
RAINER: "An all electronic field-store
television standards converter"
• **Television Engineering Handbook, K. BLAIR**
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Description

BACKGROUND OF THE INVENTION

The present invention relates to a video taperecorder for recording and reproducing a video signal which can easily convert television standards to record and reproduce a desired television standards signal.

The television standards now used in all the countries in the world are not unified, but several kinds of signal modes are used therefor. The typical television standards include three systems of NTSC (National Television System Committee), PAL (Phase Alternation by Line) and SECAM (Séquentiel à Mémoire); some systems in which these typical television standards are slightly modified are also used.

The video signal modes in these three typical television standards are as follows. NTSC is basically in the mode of the interlace scanning of 30 frames/sec (field frequency of 60 Hz), the number of scanning lines per one frame of 525, and the carrier frequency for color signals of about 3.579 MHz. PAL is basically in the mode of the interlace scanning of 25 frames/sec (field frequency of 50 Hz), the number of scanning lines per one frame of 625, and the carrier frequency for color signals of about 4.433 MHz. SECAM is in nearly the same mode as in PAL except the color signal transmission process in which two color difference signals R - Y and B - Y are exchanged for each scanning line, i.e. the chrominance subcarrier is frequency-modulated in a line sequential manner.

Household video tape recorders (VTR's) are usually designed to adapt the television standards in a consumer country. For example, for Japan and U.S.A, adopting NTSC, they are designed so that the rotating frequency of a rotary head is set for 30 Hz which is half the field frequency, one field signal corresponding to 262.5 H's (H: one scanning line) is recorded on one track, and a color signal is recorded in a manner of converting the carrier chrominance signal as a color signal is converted from 3.579 MHz to a low frequency of 629 KHz. Also, for the countries adopting PAL such as West Germany, China, etc. the VTR's are designed so that the rotating frequency of a rotary head is set for 25 Hz, one field signal corresponding to 312.5 H's is recorded on one track, and a color signal is recorded in a manner of converting it from 4.433 MHz to the low frequency of 627 KHz. Moreover, for countries adopting SECAM such as France, the VTR's are designed so that a frequency-modulated color signal is recorded in a manner of converting it into a low frequency or counting down (frequency dividing) it. Additionally, the played-back signal, since the television receivers in each country are adapted to the television standards adopted in the country, is outputted in the signal mode corresponding to that television standards.

It should be noted that VTR's adapting to plural television standards are shipped for areas in Europe

where both PAL and SECAM can be received, and for areas where sources of plural television standards are intermingled, such as the Near and Middle East and Southeast Asia.

As described above, since the household VTR's are designed so that they adapt to the television standards adopted in the area concerned, for example, it was impossible to play back, in Japan, the tape recorded in PAL and also impossible to play back in West Germany the tape recorded in NTSC. Moreover, the VTR's adapted to plural television standards for e.g. the Near and Middle East, can play back the tape recorded in plural television standards; however, the reproduced image involves expansion and contraction to be unsightly, and also the VTR's cannot convert one television standards into another one so as to record the NTSC source in PAL, for example.

Previously known techniques for converting a certain television standards signal into another television standards signal are disclosed in, for example,

(1) K.B. Benson: CBS Television Standard Conversion Technique, J. SMPT, Vol. 70, No. 628 (1961), and

(2) P. Paiger: An all Electronic field-store Television Standards Converter, E. BIU Rev. Part A-Technical, No. 103, p. 90 (1967).

These techniques, however, are embodied in an apparatus constructed in a large scale system; since such an apparatus is expensive and requires a large space, it could be only installed in e.g. a television station. Also, if these techniques are to be used in combination with a television and VTR, troublesome operations of changing the manner of connecting the respective units and setting a new mode were required.

In recent years, there is a growing tendency for information in the world to be unified or centralised and so an eager demand of freely exchanging images among countries. As understood from the above description, the present household VTR's are very insufficient to satisfy such a demand.

US-A-4 283 736 describes a video signal reproducing apparatus for converting a first video signal having a first field frequency to a second video signal having a second field frequency, including a tape scanning device which is made movable in a direction perpendicular to the recording track on a tape, a system for controlling the speed of the scanning device, a system for shifting the scanning device in the aforesaid direction according to the difference between the first and second field frequencies, in order to skip or repeat selected fields so that the video signal is reproduced with the second field frequency. Also described is a system for converting the number of lines contain in one field of the first video signal. In the above converting system there is included a memory, and the first video signal is written into the memory and read out therefrom so that a predetermined

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number of lines of the first video signal are discarded or repeated and the reproduced video signal has the required number of lines for each field of the second video signal.

In view of the aforementioned problem of converting from one standard to another, one of the aims of the invention is to provide a video tape recorder which can play back a tape recorded in television standards different from those adopted in one's own country and which can record video signals in different television standards from those adopted in one's own country.

The features of the invention are as defined by Claim 1.

In accordance with the present invention, in recording, the television standards signal converter is adapted to be connected before a recording processing circuit to permit a different television standards signal to be recorded whereas in play-back, it is adapted to be connected behind a playback processing circuit to permit a different television standards signal to be output. Thus, a recording tape can be formed in different television standards from those adopted in one's own country, and the tape recorded in the television standards adopted in the other country can be played back in the television receiver adapted to the television standards adopted in one's own country; international video information, therefore, can be unified through the VTR of the present invention.

The first object of the present invention is to provide a video taperecorder (VTR) which is conveniently operated with any of various television standards.

The second object of the present invention is to provide a VTR which permits a user to play back or form the video tape in different television standards through a simple operation.

The third object of the present invention is to provide a VTR which can exhibit an efficient and legible display.

The fourth object of the present invention is to provide a VTR incorporating means for converting television standards through a simple circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of the video taperecorder (VTR) with a television standards converter (TSC) according to the present invention;

Figure 2 is a block diagram of one embodiment of the television standards converter used in the present invention;

Figure 3 is a block diagram of one embodiment of the VTR with a TSC according to the present invention in which the switching state between a recording mode and reproducing mode is illustrated;

Figure 4 is a basic block diagram of the VTR with a TSC according to the present invention in which the basic configuration of a convert control means 10 is illustrated;

Figure 5 is a circuit diagram of a circuit for detecting

the television standards in the convert control means;

Figure 6 is a view showing a concrete construction of the order switch 29 in the convert control means which can select desired television standards by appointing a nation name;

Figure 7 is a view showing another construction of the order switch 29 in the convert control means which can select desired television standard by appointing a nation name or television standards;

Figure 8 is a circuit diagram of the circuit of the order switch corresponding to Figure 7;

Figure 9 is a view showing the assembly of a switch panel including the order switch in the convert control means and a lighted display;

Figure 10 is a block diagram showing the relationship between the basic construction of the VTR with a TSC according to the present invention and the convert control means including a television standards detector 35;

Figure 11 is a block diagram of the detailed configuration of the convert control means including a display;

Figure 12 is a block diagram showing the relationship between another embodiment of the convert control means and the VTR with TSC according to the present invention; and

Figure 13 is a block diagram for assisting the understanding of the operation of the convert control means.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to the drawings, a video tape recorder according to one embodiment of the present invention will be explained. Fig. 1 is a block diagram of one embodiment of the video tape recorder according to the present invention. In Fig. 1, (A) indicates a recording mode; 1 is an antenna terminal, 2 is a tuner, 3 is a video input terminal, 4 is an input changeover switch, 5 is a television standards converter which converts the television standards in accordance with convert control means 10, 6 is a video signal recording processor, 7 is a video output terminal, 8 is a rotary head, and 9 is a servo circuit. (B) indicates a playback mode in which a video signal playback processor is arranged between the rotary head 8 and the television standards converter 5.

The operation of the VTR thus constructed will be explained. It is now assumed that the VTR according to this embodiment is used in Japan and U.S.A.

The operation in the recording mode is as follows. A television signal supplied from the antenna terminal 1 is tuned and demodulated by the tuner 2. The signal thus generated appears as an NTSC composite signal at the television terminal TV of the input changeover switch 4. Assuming that the changeover switch 4 has selected the

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television signal, the NTSC composite signal is supplied to the television standards converter 5 which serves to convert the television standards in response to an instruction from the convert control means 10. Now it is assumed that the convert control means 10 has instructed the converter to select the NTSC signal. In this case, since an input signal to the television standards converter 5 is the NTSC signal, the television standards converter 5 permits the NTSC signal to pass so as to be supplied to the video signal processor 6 and servo circuit 9. Then, the convert control means 10 instructs both servo circuit 9 and video signal processor 6 to receive the NTSC signal. In response to this, in order that the NTSC signal can be recorded, the servo circuit 9 supplies a control signal to a capstan motor, a cylinder incorporating the rotary head 10, and a control head for recording the control signal. Also, in order that the received NTSC signal can be recorded using the rotary head 8, the video signal recording processor 6 performs suitable processings such as emphasis and frequency modulation. Then, the NTSC signal which is also an output from the television standards converter 5 is sent to the video output terminal 7. In this way, if the convert control means 10 selects NTSC, the VTR according to this embodiment operated in entirely the same way as the conventional VTR for the NTSC bloc.

On the other hand, if the convert control means 10 selects PAL, the television standards converter 5 operates to convert the input NTSC signal to a PAL signal, and also the servo circuit 9 and video signal processor 6 operate to permit the PAL signal to be recorded. Thus, the NTSC television signal input to the antenna terminal 1 and tuned/demodulated by the tuner 2 can be recorded as the PAL signal on a magnetic tape by the rotary head 8. Then, the NTSC signal before the conversion, which is sent to the video output terminal 7, can be monitored by a usual NTSC television receiver. In this way, a record tape in the PAL standards which are different from the NTSC standards by which the broadcasting is carried out can be formed.

Moreover, if the changeover switch 4 selects a video signal (but not the television radio wave), the video signal applied to the video input terminal 3, e.g. the played-back NTSC signal supplied from the other VTR can be converted into the PAL signal by the television standards converter 5 thereby to be recorded; the video information recorded in NTSC can be dubbed in PAL.

Although in the above explanation, the conversion from NTSC to PAL was made, the conversion reverse to it and to the other standards including SECAM can also be made.

It will be needless to say that the antenna terminal 1 and tuner 2 shown in Fig. 1A may not be necessarily provided and so a VTR of the present invention may be arranged with a video input terminal 3 without including such antenna terminal and tuner.

The operation of the playback mode in (B) is as follows. Now it is assumed that the tape recorded in PAL

has been set in the VTR according to this embodiment. Then, the signal included in the tape is picked up by the rotary head 8 and the signal thus formed is subjected to the processings such as de-emphasis and FM modulation by the video signal processor 11; the PAL thus played back appears at the output of the video signal processor 11 (In this case, the television standards in which the signal was recorded are usually decided automatically by, for example, measuring the field frequency based on the control signal recorded on a control track; the instruction for carrying out it is supplied to the video signal playback processor 11 or the servo circuit 9). However, the played-back PAL signal, when monitored as it is, cannot provide a normal image (no image appears or a very unsightly image appears) since the television receivers used in Japan and U.S.A. correspond to the NTSC standards. For this reason, the control convert means 10 is adapted to select NTSC; when an instruction is provided to the television standards converter 5, the converter 5 converts a supplied played-back PAL signal into an NTSC signal which is sent to the video output terminal 7. Therefore, if an NTSC television receiver is connected with the video output terminal 7, normal image can be monitored. Thus, the tape recorded in PAL can be normally monitored in the NTSC television receiver. Of course, the conversion from NTSC to PAL or to the other television standards including SECAM can be easily made.

Fig. 2 is a block diagram of one embodiment of the television standards converter 5 in Fig. 1. In operation, a composite signal applied to an input terminal 12 is separated into a luminance signal and chrominance signal by a Y-C separator 13. The luminance signal is digitized by an A/D converter 14 and the digitized luminance signal is applied to a memory 20. The chrominance signal is demodulated in accordance with the television standards such as NTSC, PAL, SECAM, etc. by a decoder 15. The color difference signal thus formed is digitized by an A/D converter 16 and applied to the memory 20. The memory 20, which is a digital memory storing a video signal over one or more fields, is controlled by a memory control circuit 21. A write clock therefor is supplied by a write clock generator 19 on the basis of the synchronous signal which is provided through a low pass filter 17 and a sync. separator 18 from the input signal. A read clock is supplied by a clock generator 22. The luminance signal of the digital signals subjected to the television standards conversion in the memory 20 is restored to the analog signal by a D/A converter 23. The digital color difference signal is restored to an analog signal by a D/A converter 24; the analog color difference signal is modulated into a carrier chrominance signal which adapts to each of the television standards such as NTSC, PAL, SECAM, etc. A mixer 26 mixes the luminance signal and the carrier chrominance signal to provide the composite signal subjected to the television standards conversion to an output terminal.

The operation of the television standards conver-

sion will be explained. Now it is assumed that NTSC is to be converted into PAL. In NTSC, the field frequency is 60 Hz and the number of scanning lines per one field is 525/2, whereas in PAL, the former is 50 Hz and the latter is 625/2. The field frequency and the number of scanning lines per one field, therefore, must be converted. In order to realize this, the memory is constructed so that the signal corresponding to one field written at a predetermined write clock can be read by a read clock independent of the write clock. Now if a conversion instruction from NTSC to PAL comes to the memory control circuit 21, for conversion of the field frequency, 60 fields in NTSC are read as 50 fields in PAL; this can be realized by controlling the memory so that it skips one field for every six fields. The conversion of the number of scanning lines from 525/2 to 625/2 can be realized by using a line memory in the memory 20 to interpolate new scanning line information from adjacent items of scanning line information. The above controls are made by selecting or arithmetically operating the information in the memory 20 in accordance with a control signal supplied from the memory control circuit 21.

On the other hand, the conversion from PAL to NTSC can be realized in such a manner that for conversion of the field frequency, one field is read twice for every six fields, and for conversion of number of scanning lines per one field, two items of scanning line information are operated. In this case, it should be noted that the luminance signal and the chrominance signal are processed separately in the memory 20.

Additionally, since SECAM is the same as PAL in the field frequency and the number of scanning lines per one line, but different from PAL in that the color signal is FM modulated to be line-sequentially multiplexed, the conversion to SECAM can be realized by the color signal processing considering the difference.

It can be apparent to those skilled in the art that by providing more memories and interpolating fields or the frames instead of the technique described in connection with Fig. 2, more advanced conversion of the television standards can be realized.

Fig. 4 shows a modification of the above embodiment of the VTR according to the present invention. This embodiment is different from that of Fig. 1 in only that the television standards converter 5 and the convert control means 10, which are separately provided for the recording mode and the playback mode in Fig. 1, are shared in both recording mode and playback mode, and a video signal recording/playback processor 28 is adapted to change the processing through an internal circuit. More specifically, a recording/playback change-over switch (R/P changeover SW) 36 serves to change the processing in the video signal recording/playback processor 28, and also change the input to the television standards converter 5 and the output to video output terminal 7. Thus, this modification also permits the recording and playback to be realized between different television standards.

As described above, the VTR according to this embodiment is provided with the servo system(s) and video signal processing system(s) which permit the recording and playback to be carried out for different television standards signals, and the television standards converter(s) for converting one television standards signal into another television standards signal; the VTR, thereby, includes a mode for converting an input television standards signal into another television standards signal to be recorded, and a mode for converting a played-back television standards signal into another television standards signal to be outputted. Thus, the field of the usage of the VTR can be widened; the usage includes recording a television program broadcast in Japan on a video tape in PAL in order to send the tape to a friend staying in the PAL bloc in Europe, carrying back a video software from Europe to enjoy it in Japan, and dubbing in PAL a tape of how a family are doing made using a video movie machine to send the dubbed tape to a member of the family staying in Europe.

Meanwhile, the names of the television standards such as NTSC, PAL, SECAM, etc. are not familiar to average users, and usually they do not have knowledge on which television standards are adopted in which country. As the case may be, therefore, it is not suitable to cause a user or operator to designate a desired television standard name alone.

In accordance with another embodiment of the VTR according to the present invention as shown in Fig. 4, if a desired country is designated, the corresponding television standards can be automatically selected; therefore, the tape recorded in different television standards from those in one's own country can be easily played back, and also a record tape can be easily formed in different television standards from those in one's own country.

The embodiment of Fig. 4 is different from that of Fig. 1 in that the convert control means 10 is composed of an order switch 29 and a convert mode detector 30. The order switch 29 is a switch by which a user designates an object country name, e.g. a push switch on which country names are exhibited. The convert mode detector 30, on the basis of the country name designated by the order switch 29, serves to select the corresponding television standards to control the conversion operation in the television standards converter 5. Thus, if a user selects U.S.A. by the order switch 29, the convert mode detector 30 selects NTSC as the television standards, and if West Germany is designated, the convert control switch 30 selects the corresponding PAL. In this way, the user is only required to select a desired country name, but not required to have knowledge on the television standards.

Fig. 5 shows an example of the concrete circuit for the order switch 29 and the convert mode detector 30. In Fig. 5, the order switch 29, encircled by a broken line, includes plural switches a, b, c, ... g, h arranged correspondingly to each of countries; e.g. the countries in the

same television standards are unified to input to NAND (or OR) gates 32, 33 and 34. For example, when the switch b corresponding to Japan is closed, the output from the NAND gate 32 becomes a high level 'H'; namely the output line of NTSC becomes 'H'. This means that the convert control means 10 has selected NTSC. Likewise, the switches d, e, f corresponding to the countries adopting PAL are input to the NAND gate 33 and the switches g, h corresponding to the countries adopting SECAM are input to the NAND gate 34. In this way, if the names of the countries adopting the same television standards are effectively made OR inputs, the output of the television standards can be encoded from the designation of the country name.

Fig. 6 shows an example of the order switch 29 which is designed so as to be easier for the user to use, i.e. a switch panel which permits the user to designate a desired country on a world map familiar to the user. This switch panel is composed of a sheet on the surface of which a world map is illustrated and the names of main countries are arranged in matrix using drawing lines, and touch switches arranged below the country names so that the name touched by the user can be detected. The order switch 29 according to this embodiment, on which the world map is illustrated, permits a desired country to be swiftly found out in designating the country name. The panel switch can be made more visual and effective by exhibiting the national flags and others on the sheet.

Figs. 7 and 8 show the other example of the order switch 29 in the convert control means 10. As mentioned above, if the order switch can designate not only television standards which are unfamiliar to a user but a country name, it provides excellent operability. If the user has knowledge on the television standards, however, it is convenient to use the name of television standards. Moreover, most cassettes of the recorded tape have an indication of not the name of a country where the recorded tape was formed, but the name of the television standards adopted. In such a case also, it is convenient to use the television standards. This example relates to an order switch designed so as to satisfy both requirements.

Fig. 7 shows a switch panel for such an order switch 29. This switch panel is composed of a sheet on the surface of which a world map is illustrated and the names of main countries are arranged in matrix using drawing lines, and also the names of television standards such as NTSC, PAL, etc. are exhibited on the lowest column, and touch switches arranged below the country names and the names of the television standards so that the name of the country or of the television standards touched by the user can be detected.

Fig. 8 shows a concrete circuit of the order switch 29 and the convert mode detector 30 in this example. In Fig. 8, the order switch 29, encircled by a broken line, includes plural switches a, b, c, ... g, h arranged correspondingly to each of countries; the countries in the

same television standards are unified to input to OR gates 32, 33 and 34. Also, switches x, y and z corresponding to the television standards such as NTSC, PAL, etc. are input to the corresponding OR gate. Now, for example, when the switch b corresponding to Japan is closed, the output from the OR gate 32 becomes a high level 'H'; namely the output line of NTSC becomes 'H'. This means that the convert control means 10 has selected NTSC. Likewise, the switches d, e, f corresponding to the countries adopting PAL are input to the OR gate 33 and the switches g, h corresponding to the countries adopting SECAM are input to the OR gate 34. On the other hand, when the switch x for the television standards is directly closed, the output from the OR gate 32 becomes 'H' so as to select NTSC. In this way, if the user designates either the country name or the television standards, the corresponding television standards can be easily selected.

Fig. 9 shows a structure of the convert control means 10, particularly the order switch 29 designed so that a user can designate desired television standards more correctly and swiftly. As understood from the above explanation, the order switch for controlling the convert action and its display are very important for the VTR in which the television standards are converted for recording or playback. The convert control means according to this example is provided with a display part on which a desired country name or television standards designated from an operation panel by a user emits light, so that which country or which television standards has been designated can be detected at a glance. Therefore, the user can recognize immediately if or not designated country name or television standards is correct thereby to enhance easiness and certainty in the operation of the convert control means 10. Also, an order switch visually good design can be obtained.

The order switch 29 shown in Fig. 9 is composed of a print film (A), a transparent electrode touch sheet (B) and a light emission device such as EL (electroluminescence) light-emitting plate (C); they are successively piled. (A) is the transparent film on which the country names such as Japan, West Germany, France, etc. and the television standards such as NTSC, PAL, etc. are printed. (B) is a switch in which transparent electrodes are arranged on a transparent film so as to provide X outputs and Y outputs as shown in broken lines; when a user presses a country name to be designated on the print film (A), the corresponding X column electrode and Y row electrode are brought into contact. This state can be electrically detected from the X output and the Y output. (C) is the EL light-emitting plate in which the portions painted in black constitute electrodes, and when an A.C. voltage is applied between the electrodes and ground GND is applied, only the portions corresponding to the electrodes selectively emit light. In the case of this example, 'Japan' and 'NTSC' are connected to extract an NTSC terminal; if an A.C. voltage is applied between the NTSC terminal and ground, therefore, 'Japan' and

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'NTSC' on the print film (A) emit light. Thus, if the order switch 29 is constituted in such a way that when the country name on the print film (A) is touched, the country name is detected by the touch sheet (B) and key matrix circuit of e.g. a microcomputer, and the detected output on-off controls the driving voltage for the EL light emitting plate (c), the order switch 29 which emits light simultaneously with touching of the country name and continues to emit light during the use can be realized. Moreover, if the country names on the print film (A) are distinguished by using different colors, the country names belonging to the respective television standards can be displayed in different colors. Incidentally, it should be noted that the light emitting plate (C) can also be constituted using liquid crystal or light emitting diodes as well as EL.

Referring to Fig. 10, still another embodiment of the VTR with the television standards converter(s) will be explained. The VTR according to this embodiment is designed to be more effectively used than in the previous embodiments. This embodiment is different from the embodiment of Fig. 4 in that a television standards detector 35 is added to the convert control means 10. More specifically, the convert control means 10 is composed of the order switch 29 by which a user designates a desired country or television standards, the television standards detector 35 for detecting the television standards of the signal to be inputted to the television standards converter 5, and the convert mode detector 30 for deciding the conversion operation mode to be made in response to the outputs from the television standards detector 35 and the order switch 29. Now, in the recording mode (A), it is assumed that an input signal is an NTSC signal and the user has designated the television standards to PAL. Then, the television standards detector 35 supplies an output of NTSC to the convert mode detector 30 while the order switch 29 supplies an output of PAL to the convert mode detector 30. In response to these outputs, the convert mode detector 30 sets the conversion mode from NTSC to PAL to instruct the television standards converter 5 to convert NTSC to PAL. On the other hand, in the playback mode (B), the signal recorded on a tape is played back by the rotary head 8 to be sent to the video signal playback processor 11. The output from the video signal processor 11 is sent to the television standards detector 35 to decide the television standards of the played-back signal. This decision is made by the field frequency which can be known from the time interval of a control signal recorded on the tape, or the format of the color signal. Further, the television standards in which the signal is to be output is designated using the order switch 29. In response to the outputs from the television standards detector 35 and the order switch 29, the convert control means 30 sets the mode of conversion to be made, and controls the television standards converter 5. In this way, the convert control means 10 decides the conversion mode using both the television standards detected by the television

standards detector 35 and those designated by the user through the order switch 29. Incidentally, the television standards detector 35 is desired to be designed to automatically detect the television standards.

A further embodiment of the present invention will be explained with reference to Fig. 11. This embodiment intends to simply inform a user of the operation of conversion of television standards. The television standards detector 35 detects the television standard of the signal to be input to the television standard converter 5, and sends the information to a display selector 39 as well as the convert mode detector 30. On the other hand, the designation (name of a country or television standards) from the order switch 29 is encoded into the television standards such as NTSC, PAL, SECAM, etc.; the information is supplied to the display selector 39 as well as the conversion mode detector 30. As described previously, on the basis of both items of information, the conversion mode detector 30 sets the mode of conversion to be made, and instructs the television standards converter 5 to carry out the conversion.

Thus, supplied to the display selector 39 are the output from the television standards detector 35, which is the television standards of a conversion origin, and the output from the order switch 29, which is the television standards of a conversion destination; one of them is selected by a display switch 42 and displayed on a display 41 through a drive circuit 40 (For example, the corresponding parts in the switch as shown in Fig. 7 emit light). If the display switch 42 is brought into contact with the side of FROM, the television standards of the conversion source are displayed; if the display switch is brought into contact with the side of TO, the television standards of the conversion destination is displayed. In this way, with the display 41 being single, the provision of the display switch 42 permits the user to acquire effective information.

Further, the display switch 42 can be easily engaged with the recording/playback changeover switch 36 in Fig. 3 so as to automatically select TO for recording and FROM for playback. In this way, in recording, the country or television standards corresponding to the tape to be recorded can be displayed, whereas in playback, the country or television standards corresponding to the tape being played-back can be known at a glance. Thus, a very comfortable switch and display can be realized.

Now referring to Fig. 12, the VTR according to a still further embodiment of the present invention will be explained. This embodiment intends to easily record/play back a multi-television standards signal or select a signal to be output to a television monitor. Since the entire operation was explained in connection with Figs. 1 to 3, the construction and operation of the convert control means 10 will be explained.

35 is a television standards detector for detecting the television standards of the signal played-back from a tape; 43 and 44 are first and second order switches

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for designating conversion modes (e.g. mode of converting NTSC to PAL, mode of converting PAL to NTSC, etc.); and 30 is a convert mode detector for controlling the conversion operation of the television standards converter 5 on the basis of the the output from the television standards detector 35 and the output from the first order switch 43 or the second order switch 44. In this arrangement, the television standards of the conversion source can be obtained from the television standards detector 35 and the first order switch 43, whereas the television standards of the conversion destination can be obtained from the first order switch 43 or the second order switch 44. The convert control means 10, therefore, can surely understand the intention of a user to decide the conversion mode.

Fig. 13 shows a detailed construction of the convert mode detector 30 in Fig. 12. In Fig. 13, 45 is a source selector for selecting the television standards before conversion of the television signal to be converted by the television standards converter 5, and 46 is the other selector for selecting the television standards after conversion. Now, in the playback mode, in order to decide the conversion mode for the television standards converter 5, the source selector 45 selects the standards detected by the television standards detector 35 and the other selector 46 selects the standards designated by the first order switch 43; if the standards of the conversion source are the same as those of the conversion destination, the television standards converter 5 does not convert the television standards but produces the television signal in the original television standards. In the recording mode, the source selector 45 selects the standards designated by the first order switch 43 and the other selector 46 selects the standards designated by the second order switch 46. In this embodiment, the first order switch 43 may be usually set for the television standards adopted in the country in using the VTR and may be reset for different standards in taking out the VTR to use it in the country adopting the different television standards. In this way, in the playback mode, the signal played back from a tape can be output, regardless of its television standards, in the television standards adopted in a user's own country and so can be easily monitored by the television receiver on sale in the user's own country through the playback operation of the VTR. In the recording mode, an input television signal can be recorded in any television standards by only designating the television standards of the signal to be recorded on the tape using the second order switch 44.

Incidentally, although the operation of the convert control means 10 was realized in hardware in all the embodiments described hitherto, of course, it may be implemented using a microcomputer.

As understood from the explanation made hitherto, in accordance with the present invention, using a single inexpensive miniaturized VTR device, it is possible to record/play back a multi television standards signal, and change the standards of the signal to be played back of

recorded. Also, it is possible to select desired television standards very easily.

Moreover, if the VTR according to the present invention includes the television standards adopted in the whole world, the VTR with a single specification can be used in anywhere in the world. Unlike before, therefore, it is not necessary to design the VTR with the specification corresponding to the country where it is to be shipped to. This permits the fabrication process to be standardized and reduces the production cost of the VTR.

The present invention is an answer to a difficult problem that the television standards adopted all over the world are not unified. Namely, the present invention can break through the barrier of television standards to unify video information all over the world, thereby providing a very great advantage of remarkably enlarging the use of the VTR.

Claims

1. A video tape-recorder capable of handling a plurality of different television standards, said standards being respectively representative of those using luminance and chrominance signals having different field frequencies and of those using different numbers of horizontal scanning lines, or both, said video tape-recorder comprising:

video signal conversion means (5) adapted to receive and to convert a video signal, in an original one of said standards, into a corresponding converted video signal in another and selected one of said standards, the conversion means (5) including at least one field memory (20) and a plurality of line memories (20);

control means (10) for selecting any one of said standards;

recording and playback means (1-3, 6, 8, 9 and 11) comprising a rotary head (8) for recording video signals on, or playing back video signals from, a recording medium; said recording and playback means (1-3, 6, 8, 9 and 11) having a recording mode for recording, on said medium, said corresponding converted video signal, in the selected other standard, and a playback mode whereby a recorded converted signal can be played back and supplied to the convertor so as to reproduce the video signal in either the original, or another selected standard; characterised in that:

the control means (10) instructs the conversion means (5)

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to convert the received signal, which is in the original standard, into the selected standard for recording; and

to convert the played back signal, from the standard in which it was recorded, into the selected standard for reproduction;

said recording and playback means (1-3, 6, 8, 9 and 11) include servo means (9), which is controlled by said control means (10), in order to control the drive speed of said rotary head (8) and the transport speed of said recording medium; said control means (10) effecting said speed control:

so as to cause a control signal, which is used in the selected standard, to be recorded on the medium when the video signal is converted from one to another standard and then recorded, and

so as to cause a control signal, which is used in the selected standard of the reproduced video signal, to be produced when the recorded signal is played back and then converted into the latter selected standard.

2. A VTR according to Claim 1 and including switch means (36) for selectively switching of said tape-recorder between said recording mode and said playback mode.
3. A VTR according to claim 1, wherein said control means (10) comprises an order switch (29) by which a user designates television standards, and a convert mode detector (30) for deciding the conversion operation in accordance with the order switch whereby the conversion operation of said conversion means (5) is controlled by an output from said convert mode detector (30).
4. A VTR according to claim 1, wherein said control means (10) comprises an order switch (29) by which a user can designate a desired country name, and a convert mode detector (30) for selecting the television standards corresponding to the designated country name to decide the conversion operation whereby the conversion operation of said television standards converter (5) is controlled by an output from said convert mode detector (30).
5. A VTR according to claim 4, wherein said order switch (29) is a switch panel on which a world map is exhibited to permit a user to designate a desired country name.
6. A VTR according to claim 1, wherein said convert

control means (10) comprises an order switch on which names of countries and/or television standards are exhibited, and a convert mode detector (30) for deciding a conversion mode in accordance with the name of the country or television standards designated by said order switch.

7. A VTR according to claim 1, said control means (10) comprises an order switch (29) for designating a desired name of country or television standards and a convert mode detector (30) for deciding a conversion mode in accordance with the order switch, said order switch being composed of a group of switches indicating names of countries and television standards and a display part for displaying by light emission the name of the country or television standards in accordance with the operation of the group of switches, whereby on the basis of the designation from the group of the switches, a desired name of country or television standards is displayed by light, and said convert mode detector (30) decides the corresponding conversion mode.
8. A VTR according to claim 7, wherein said order switch (29) is composed of a print film (A) on which names of countries and/or television standards are exhibited, a touch switch (B) provided with transparent electrodes which is arranged below said print film, and a light emission device (C) which is locally arranged below said touch switch so as to cause a desired portion to emit light, whereby the desired name of the country or the television standards are displayed by light emission of the light emission device through the operation of said touch switch.
9. A VTR according to claim 7, wherein said order switch (29) displays all the names of countries adopting the same television standards as those in the designated country or the designated television standards.
10. A VTR according to claim 1, wherein said control means (10) comprises a television signal standard detector (35) for detecting the television standards of an input television signal, an order switch (29) for designating a desired country name or desired television standards, and a convert mode detector (30) for detecting a conversion mode whereby said convert mode detector decides the convert mode of converting the television standards detected by the television standards detector (35) as a conversion source to the those designated by the order switch (29) as a conversion destination, thereby controlling the television standards converter (5) so that it converts a television signal from the signal of the conversion source to that of the conversion destination.
11. A VTR according to claim 10, wherein said control

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means (10) further comprises a light emitting display (41) for displaying names of countries and television standards, and said light emitting display part is driven to display the name of the television standards and country of the conversion source and those of the conversion destination.

12. A VTR according to claim 11, wherein said control means (10) further comprises a display selector (39) which selects either one of the name of the country or the television standards obtained by said television standards detector (35) and that designated by said order switch (29) thereby to drive said display (41).

13. A VTR according to claim 12, wherein said display selector (39) is operated, in a recording mode, to select the television standards or country name designated by said order switch (29), and in playback mode, to select the television standards or country name automatically detected by said television standards detector (35) from the signal played back from a tape.

14. A VTR according to claim 1, wherein said control means (10) comprises a television signal standard detector (35) for detecting the television standards of an input television signal, a first order switch (43) and a second switch (44) for designating a desired country name or desired television standards, and a convert mode detector (30) for detecting a conversion mode whereby said convert mode detector decides the convert mode of converting the television standards detected by the television standards detector (35) or that designated by said first order switch (43) as a conversion source to the those designated by said first order switch (42) or said second order switch (44) as a conversion destination, thereby controlling the television standards converter (5) so that it converts a television signal from the signal of the conversion source to that of the conversion destination.

15. A VTR according to claim 14, wherein said convert mode detector (30) is operated, in a playback mode, to set the television standards detected by said television standards detector (35) as a conversion source and that designated by said first order switch as a conversion destination, and in the other mode, set the television standards designated by said first order switch (43) as a conversion source and that designated by said second order switch (44) as a conversion destination.

16. A VTR according to claim 1, wherein said television standards converter (5) comprises an A/D converter (14, 16) for converting an input analog video signal into a digital signal, a memory (20) for the video

signal corresponding to at least one field, a memory control circuit (21) for controlling said memory, a sync separator (18) for separating a synchronization signal from said input video signal, a write clock generator from a write clock from an output from said sync separator, a read clock generator (22) for generating a read clock for reading out the data stored in said memory, and a D/A converter (23, 24) for restoring the digital signal into an analog signal.

17. A VTR according to claim 16, wherein said A/D converter separately converts a luminance signal and a color difference signal of the input video signal into digital signals and said D/A converter also separately restores the digitized luminance signal and color difference signal into analog signals.

18. A VTR according to claim 1, wherein said memory (20) comprises a field memory with units of one field, and line memory with units of one field, and said field memory is used to convert a field frequency through skip or overlap read per one field and said line memory is used to convert the number of scanning lines per one field through interpolation.

19. A VTR according to claim 1, wherein said conversion means (5) comprises a decoder (15) for acquiring a color difference signal from an input video signal and an encoder (25) for acquiring a desired carrier chrominance signal from the color difference signal.

Patentansprüche

1. Videobandaufzeichnungsgerät, das eine Anzahl verschiedener Fernsehstandards verarbeiten kann, wobei die Standards jeweils für solche stehen, die Luminanz- und Chrominanzsignale mit unterschiedlichen Halbbildfrequenzen verwenden, und solche, die unterschiedliche Anzahlen von Horizontalrasterzeilen verwenden, oder beides, wobei das Videobandaufzeichnungsgerät aufweist:

eine Videosignalumwandlungseinrichtung (5), die zum Empfangen und Umwandeln eines Videosignals in einem Ursprungsstandard der Standards in ein entsprechendes umgewandeltes Videosignal in einem anderen und ausgewählten der Standards ausgelegt ist und zumindest einen Halbbildspeicher (20) und eine Vielzahl Zeilenspeicher (20) aufweist; eine Steuereinrichtung (10) zum Auswählen eines beliebigen der Standards; eine Aufzeichnungs- und Wiedergabeeinrichtung (1-3, 6, 8, 9 und 11) mit einem Drehkopf (8) zum Aufzeichnen von Videosignalen auf oder Wiedergeben von Videosignalen von ei-

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nem Aufzeichnungsmedium; wobei die Aufzeichnungs- und Wiedergabeeinrichtung (1-3, 6, 8, 9 und 11) einen Aufzeichnungsmodus zum auf dem Medium Aufzeichnen des entsprechenden umgewandelten Videosignals in dem ausgewählten anderen Standard und einen Wiedergabemodus, durch den ein aufgezeichnetes umgewandeltes Signal wiedergegeben und der Umwandlungseinrichtung zugeführt werden kann, um das Videosignal in entweder dem Ursprungs- oder einem anderen ausgewählten Standard wiederzugeben, dadurch gekennzeichnet, daß:

die Steuereinrichtung (10) die Umwandlungseinrichtung (5) veranlaßt,

das empfangene Signal, das im Ursprungsstandard ist, in den ausgewählten Standard zur Aufzeichnung umzuwandeln; und
das wiedergegebene Signal aus dem Standard, in dem es aufgezeichnet wurde, in den ausgewählten Standard zur Wiedergabe umzuwandeln;

die Aufzeichnungs- und Wiedergabeeinrichtung (1-3, 6, 8, 9 und 11) eine Servoeinrichtung (9) aufweist, die von der Steuereinrichtung (10) gesteuert wird, um die Antriebsgeschwindigkeit des Drehkopfs (8) und die Transportgeschwindigkeit des Aufzeichnungsmediums zu steuern;

wobei die Steuereinrichtung (10) die Geschwindigkeitssteuerung ausführt;

um die Aufzeichnung eines Steuersignals, das in dem ausgewählten Standard verwendet wird, auf dem Medium, wenn das Videosignal von einem in einen anderen Standard umgewandelt und dann aufgezeichnet wird, zu bewirken, und

die Erzeugung eines Steuersignals, das in dem ausgewählten Standard des wiedergegebenen Videosignals verwendet wird, zu bewirken, wenn das aufgezeichnete Signal wiedergegeben und dann in den letztgenannten ausgewählten Standard umgewandelt wird.

2. Videobandaufzeichnungsgerät nach Anspruch 1 mit einer Umschalteneinrichtung (36) zum selektiven Umschalten des Bandaufzeichnungsgeräts zwischen dem Aufzeichnungsmodus und dem Wiedergabemodus.
3. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem die Steuereinrichtung (10) einen Befehlsschalter (29), mit dem ein Benutzer Fernsehstan-

dards bezeichnet und eine Umwandlungsmodus-Erfassungseinrichtung (30) aufweist zum Bestimmen des Umwandlungsbetriebs entsprechend dem Befehlsschalter, wodurch der Umwandlungsbetrieb der Umwandlungseinrichtung (5) durch ein Ausgangssignal aus der Umwandlungsmodus-Erfassungseinrichtung (30) gesteuert wird.

4. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem die Steuereinrichtung (10) einen Befehlsschalter (29), mit dem ein Benutzer einen gewünschten Staatennamen bezeichnen kann, und eine Umwandlungsmoduserfassungseinrichtung (30) aufweist, um die dem bezeichneten Staatennamen entsprechenden Fernsehstandards auszuwählen, um den Umwandlungsbetrieb zu bestimmen, wodurch der Umwandlungsbetrieb der Fernsehstandard-Umwandlungseinrichtung (5) durch ein Ausgangssignal aus der Umwandlungsmodus-Erfassungseinrichtung (30) gesteuert wird.

5. Videobandaufzeichnungsgerät nach Anspruch 4, bei dem der Befehlsschalter (29) eine Schalttafel ist, auf der eine Weltkarte gezeigt wird, um einem Benutzer die Bezeichnung eines gewünschten Staatennamens zu erlauben.

6. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem die Umwandlungssteuereinrichtung (10) einen Befehlsschalter, an dem Namen von Staaten und/oder Fernsehstandards gezeigt sind, und eine Umwandlungsmoduserfassungseinrichtung (30) aufweist, um einen Umwandlungsmodus entsprechend dem Namen des Staats oder Fernsehstandards, der durch den Befehlsschalter bezeichnet ist, zu bestimmen.

7. Videobandaufzeichnungsgerät nach Anspruch 1, bei der die Steuereinrichtung (10) einen Befehlsschalter (29) zum Bezeichnen eines gewünschten Namens von Staaten oder Fernsehstandards und eine Umwandlungsmoduserfassungseinrichtung (30) aufweist, um einen Umwandlungsmodus entsprechend dem Befehlsschalter zu bestimmen, wobei der Befehlsschalter aufgebaut ist aus der Anzahl von Schaltern, die Namen von Staaten und Fernsehstandards anzeigen, und einen Anzeigeteil zum durch Lichtemission Anzeigen des Namens des Staats oder Fernsehstandards entsprechend der Betätigung der Gruppe von Schalter aufgebaut ist, wodurch auf der Basis der Bezeichnung aus der Gruppe der Schalter heraus ein gewünschter Name eines Staats oder Fernsehstandards durch Licht angezeigt wird und die Umwandlungsmoduserfassungseinrichtung (30) den entsprechenden Umwandlungsmodus bestimmt.

8. Videobandaufzeichnungsgerät nach Anspruch 7,

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- bei der der Befehlsschalter (29) aus einem Druck- bzw. Fotofilm (print film) (A), auf dem Namen von Staaten und/oder Fernsehstandards gezeigt sind, einem mit transparenten Elektroden versehenen Berührungsschalter (B), der unter dem Druck- bzw. Fotofilm angeordnet ist, und einer Lichtemissionsvorrichtung (C) besteht, die lokal unter dem Berührungsschalter angeordnet ist, um einen gewünschten Bereich Licht emittieren zu lassen, wodurch der gewünschte Name des Staates oder des Fernsehstandards durch Lichtemission der Lichtemissionsvorrichtung durch den Betrieb des Berührungsschalters angezeigt wird.
9. Videobandaufzeichnungsgerät nach Anspruch 7, bei dem die Befehlsschalter (29) alle Namen von die gleichen Fernsehstandards wie die im bezeichneten Staat oder die bezeichneten Fernsehstandards verwendenden Staaten anzeigt.
10. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem die Steuereinrichtung (10) eine Fernsehsignalstandarterfassungseinrichtung (35) zum Erfassen der Fernsehstandards eines Eingangsfernsehsignals, einen Befehlsschalter (29) zum Bezeichnen eines gewünschten Staatennamens oder gewünschte Fernsehstandards und eine Umwandlungsmoduserfassungseinrichtung (30) zum Erfassen eines Umwandlungsmodus aufweist, wodurch die Umwandlungsmoduserfassungseinrichtung den Umwandlungsmodus der Umwandlung der durch die Fernsehstandarterfassungseinrichtung (35) erfaßten Fernsehstandards als Umwandlungsquelle in die durch den Befehlsschalter (29) bezeichneten als Umwandlungsziel bestimmt, wodurch die Fernsehstandardbestimmungseinrichtung (5) so gesteuert wird, daß sie ein Fernsehsignal aus der Umwandlungsquelle in das des Umwandlungsziels umwandelt.
11. Videobandaufzeichnungsgerät nach Anspruch 10, bei dem die Steuereinrichtung (10) ferner eine Lichtemissionsanzeigeeinrichtung (41) zum Anzeigen von Namen von Staaten und Fernsehstandards aufweist und die Lichtemissionsaufzeichnungseinrichtung zur Anzeige der Namen der Fernsehstandards und des Staats der Umwandlungsquelle und der des Umwandlungsziels angesteuert wird.
12. Videobandaufzeichnungsgerät nach Anspruch 11, bei der die Steuereinrichtung (10) ferner eine Anzeigerauswahleinrichtung (39) aufweist, die einen der Namen des Landes oder der Fernsehstandards, die durch die Fernsehstandarterfassungseinrichtung (35) erhalten sind und die durch den Befehlsschalter (29) bezeichnet sind, um dadurch die Anzeigeeinrichtung (41) anzusteuern.
13. Videobandaufzeichnungsgerät nach Anspruch 12, bei der die Anzeigerauswahleinrichtung (39) im Aufzeichnungsmodus so betrieben wird, daß sie die durch den Befehlsschalter (29) bezeichneten Fernsehstandards oder Staatennamen auswählt, und im Wiedergabemodus so, daß sie die von der Fernsehstandarterfassungseinrichtung (35) automatisch aus dem von einem Band wiedergegebenen Signal bestimmten Fernsehstandards oder Staatennamen auswählt.
14. Videobandaufzeichnungsgerät nach Anspruch 1, bei der die Steuereinrichtung (10) eine Fernsehsignalstandarterfassungseinrichtung (35) zum Erfassen der Fernsehstandards eines Eingangsfernsehsignals, einen ersten Befehlsschalter (41) und einen zweiten Befehlsschalter (44) zum Bezeichnen eines gewünschten Staatennamens oder gewünschten Fernsehstandards und eine Umwandlungsmoduserfassungseinrichtung (30) zum Erfassen eines Umwandlungsmodus aufweist, wodurch die Umwandlungsmoduserfassungseinrichtung den Umwandlungsmodus der Umwandlung der von der Fernsehstandarterfassungseinrichtung (35) erfaßten Fernsehstandards oder der durch den ersten Befehlsschalter (43) bezeichneten als Umwandlungsquelle in die durch den ersten Befehlsschalter (42) oder den zweiten Befehlsschalter (44) bezeichneten als Umwandlungsziel bestimmt, wodurch die Fernsehstandardumwandlungseinrichtung (5) so gesteuert wird, daß sie ein Fernsehsignal aus dem Signal der Umwandlungsquelle in das des Umwandlungsziels umwandelt.
15. Videobandaufzeichnungsgerät nach Anspruch 14, bei dem die Umwandlungsmoduserfassungseinrichtung (30) im Wiedergabemodus so betrieben wird, daß sie die von der Fernsehstandarterfassungseinrichtung (35) erfaßten Fernsehstandards als Umwandlungsquelle und die von dem ersten Befehlsschalter bezeichneten als Umwandlungsziel einstellt, und im anderen Modus so, daß sie von dem ersten Befehlsschalter (43) bezeichneten Fernsehstandards als Umwandlungsquelle und die von dem zweiten Befehlsschalter (44) bezeichneten als Umwandlungsziel einstellt.
16. Videobandaufzeichnungsgerät nach Anspruch 1, bei der die Fernsehstandardumwandlungseinrichtung (5) einen A/D-Wandler (14, 16) zum Umwandeln eines Eingangsanalogvideosignals in ein Digitalsignal, einen Speicher (20) für das zumindest einem Halbbild entsprechende Videosignal, eine Speichersteuerschaltung (21) zum Steuern des Speichers, eine Synchrontrenneinrichtung (18) zum Trennen eines Synchronsignals von dem Eingangsvideosignal, eine Einschreibtakterzeugungseinrichtung von einem Einschreibtakt aus einem

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Ausgangssignal aus der Synchronisationstrenneinrichtung, eine Auslesetakterzeugungseinrichtung (22) zum Erzeugen eines Auslesetakts zum Auslesen der in dem Speicher gespeicherten Daten und einen D/A-Wandler (23, 24) zum Wiederherstellen des Digitalsignals in ein Analogsignal aufweist.

17. Videobandaufzeichnungsgerät nach Anspruch 16, bei dem der A/D-Wandler separat ein Luminanzsignal und ein Farbdifferenzsignal des Eingangsvideosignals in Digitalsignale umwandelt und der D/A-Wandler ferner separat das digitalisierte Luminanzsignal und Farbdifferenzsignal in Analogsignale wiederherstellt.

18. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem der Speicher (20) einen Halbbildspeicher mit Einheiten eines Halbbilds und einen Zeilenspeicher mit Einheiten eines Halbbilds aufweist und der Halbbildspeicher zum Umwandeln einer Halbbildfrequenz durch Skippen (Vorschubbewegung) oder Überlappen, und zwar pro Halbbild ausgelesen verwendet wird und der Zeilenspeicher zum Umwandeln der Zahl von Rasterzeilen pro Halbbild durch Interpolation verwendet wird.

19. Videobandaufzeichnungsgerät nach Anspruch 1, bei dem die Umwandlungseinrichtung (5) eine Decodiereinrichtung (15) zum Erhalten eines Farbdifferenzsignals aus einem Eingangsvideosignal und eine Codiereinrichtung (25) zum Erhalten eines gewünschten Trägerchrominanzsignals aus dem Farbdifferenzsignal aufweist.

Revendications

1. Magnétoscope capable de traiter plusieurs normes de télévision différentes, lesdites normes étant respectivement représentatives de celles qui utilisent des signaux de luminance et de chrominance ayant des fréquences de trame différentes et de celles qui utilisent des nombres différents de lignes de balayage horizontal ou des deux, ledit magnétoscope comprenant:

un moyen (5) de conversion de signal vidéo, destiné à recevoir un signal vidéo dans une norme d'origine parmi lesdites normes et à le convertir en un signal vidéo converti correspondant dans une autre norme sélectionnée parmi lesdites normes, le moyen (5) de conversion contenant au moins une mémoire de trames (20) et plusieurs mémoires de lignes (20);
un moyen de commande (10) pour sélectionner l'une quelconque desdites normes;
un moyen (1-3, 6, 8, 9 et 11) d'enregistrement et de lecture, comprenant une tête rotative (8)

pour enregistrer des signaux vidéo sur un support d'enregistrement ou lire des signaux vidéo à partir de celui-ci; ledit moyen (1-3, 6, 8, 9 et 11) d'enregistrement et de lecture présentant un mode d'enregistrement pour enregistrer, sur ledit support, ledit signal vidéo converti correspondant dans l'autre norme sélectionnée, et un mode de lecture dans lequel un signal converti enregistré peut être lu et délivré au convertisseur de manière à reproduire le signal vidéo, soit dans la norme d'origine, soit dans une autre norme sélectionnée;

caractérisé en ce que

le moyen de commande (10) donne au moyen de conversion (5) l'instruction

de convertir le signal reçu, qui est dans la norme d'origine, en la norme sélectionnée en vue de l'enregistrement, et
de convertir le signal lu, de la norme dans laquelle il a été enregistré, dans la norme sélectionnée en vue de la reproduction;

ledit moyen d'enregistrement et de lecture (1-3, 6, 8, 9 et 11) contient un moyen d'asservissement (9), qui est commandé par ledit moyen de commande (10), afin de commander la vitesse d'entraînement de ladite tête rotative (8) et la vitesse de transport dudit support d'enregistrement;

ledit moyen de commande (10) effectuant ladite commande de vitesse

de manière à faire en sorte qu'un signal de commande, qui est utilisé dans la norme sélectionnée, soit enregistré sur le support lorsque le signal vidéo est converti d'une norme à une autre, puis enregistré, et
de manière à faire en sorte qu'un signal de commande, qui est utilisé dans la norme sélectionnée du signal vidéo reproduit, soit produit lorsque le signal enregistré est lu, puis converti dans la dernière norme sélectionnée.

2. Magnétoscope selon la revendication 1, contenant un moyen de commutation (36) pour la commutation sélective dudit magnétoscope entre ledit mode d'enregistrement et ledit mode de lecture.

3. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un commutateur d'ordres (29) par lequel un utilisateur désigne des normes de télévision, et un détecteur de mode de conversion (30) pour prendre la décision sur l'opération de conversion conformément au

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- commutateur d'ordres, d'où il résulte que l'opération de conversion dudit moyen de conversion (5) est commandée par une sortie dudit détecteur de mode de conversion (30).
4. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un commutateur d'ordres (29) par lequel un utilisateur peut désigner un nom de pays désiré, et un détecteur de mode de conversion (30) pour sélectionner les normes de télévision correspondant au nom de pays désigné pour prendre la décision sur l'opération de conversion, d'où il résulte que l'opération de conversion dudit convertisseur de normes de télévision (5) est commandée par une sortie dudit détecteur de mode de conversion (30).
5. Magnétoscope selon la revendication 4, dans lequel ledit commutateur d'ordres (29) est un panneau de commutation sur lequel une carte du monde est affichée afin de permettre à un utilisateur de désigner un nom de pays désiré.
6. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un commutateur d'ordres sur lequel des noms de pays et/ou des normes de télévision sont affichés, et un détecteur de mode de conversion (30) pour prendre la décision sur un mode de conversion conformément au nom du pays ou aux normes de télévision désignés par ledit commutateur d'ordres.
7. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un commutateur d'ordres (29) pour désigner un nom de pays désiré ou des normes de télévision, et un détecteur de mode de conversion (30) pour prendre la décision sur un mode de conversion conformément au commutateur d'ordres, ledit commutateur d'ordres étant composé d'un groupe de commutateurs indiquant des noms de pays et des normes de télévision, et d'une partie d'affichage pour l'affichage lumineux du nom du pays ou des normes de télévision conformément à l'actionnement du groupe de commutateurs, d'où il résulte que, sur la base de la désignation fournie par le groupe de commutateurs, un nom de pays désiré ou des normes de télévision apparaissent par affichage lumineux, et ledit détecteur de mode de conversion (30) prend la décision sur le mode de conversion correspondant.
8. Magnétoscope selon la revendication 7, dans lequel ledit commutateur d'ordres (29) se compose d'un film imprimé (A) sur lequel figurent des noms de pays et/ou des normes de télévision, d'une touche à effleurement (B) munie d'électrodes transparentes qui est disposée au-dessous dudit film imprimé, et d'un dispositif lumineux (C) qui est disposé localement au-dessous de ladite touche à effleurement, de sorte qu'une partie désirée émette de la lumière, d'où il résulte que le nom de pays désiré ou les normes de télévision sont présentées par affichage lumineux du dispositif lumineux lors de l'actionnement de ladite touche à effleurement.
9. Magnétoscope selon la revendication 7, dans lequel ledit commutateur d'ordres (29) affiche tous les noms de pays qui ont adopté les mêmes normes de télévision que celles du pays désigné ou que les normes de télévision désignées.
10. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un détecteur (35) de normes de signal de télévision pour détecter les normes de télévision d'un signal de télévision en entrée, un commutateur d'ordres (29) pour désigner un nom de pays désiré ou des normes de télévision désirées, et un détecteur de mode de conversion (30) pour détecter un mode de conversion, d'où il résulte que ledit détecteur de mode de conversion prend la décision sur le mode de conversion pour convertir les normes de télévision détectées par le détecteur de normes de télévision (35) en tant que source de conversion en celles qui sont désignées par le commutateur d'ordres (29) en tant que destination de conversion, commandant ainsi le convertisseur de normes de télévision (5) de sorte qu'il convertisse un signal de télévision depuis le signal de la source de conversion vers celui de la destination de conversion.
11. Magnétoscope selon la revendication 10, dans lequel ledit moyen de commande (10) comprend en outre un dispositif d'affichage lumineux (41) pour afficher des noms de pays et des normes de télévision, ledit élément d'affichage lumineux étant commandé de façon à afficher le nom de pays et les normes de télévision de la source de conversion et ceux de la destination de conversion.
12. Magnétoscope selon la revendication 11, dans lequel ledit moyen de commande (10) comprend en outre un sélecteur d'affichage (39) qui sélectionne, soit le nom de pays, soit les normes de télévision obtenues par ledit détecteur de normes de télévision (35) et ceux qui sont désignés par ledit commutateur d'ordres (29), de manière à commander ledit afficheur (41).
13. Magnétoscope selon la revendication 12, dans lequel ledit sélecteur d'affichage (39) est actionné, dans un mode d'enregistrement, de manière à sélectionner les normes de télévision ou le nom de pays désignés par ledit commutateur d'ordres (29) et, dans le mode de lecture, de manière à sélectionner les normes de télévision ou le nom de pays désignés.

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tectés automatiquement par ledit détecteur de normes de télévision (35) à partir du signal lu sur une bande.

14. Magnétoscope selon la revendication 1, dans lequel ledit moyen de commande (10) comprend un détecteur de normes de signal de télévision (35) pour détecter les normes de télévision d'un signal de télévision en entrée, un premier commutateur d'ordres (43) et un second commutateur (44) pour désigner un nom de pays désiré ou des normes de télévision désirées, et un détecteur de mode de conversion (30) pour détecter un mode de conversion, d'où il résulte que ledit détecteur de mode de conversion prend la décision sur le mode de conversion pour convertir les normes de télévision détectées par le détecteur de normes de télévision (35) ou ce qui est désigné par ledit premier commutateur d'ordres (43) en tant que source de conversion, en celles qui sont désignées par ledit premier commutateur d'ordres (42) ou ledit second commutateur d'ordres (44) en tant que destination de conversion, d'où il résulte que le convertisseur de normes de télévision (5) est commandé de sorte qu'il convertisse un signal de télévision depuis le signal de la source de conversion vers celui de la destination de conversion.
15. Magnétoscope selon la revendication 14, dans lequel ledit détecteur de mode de conversion (30) est actionné, dans un mode de lecture, de manière à établir comme source de conversion les normes de télévision détectées par ledit détecteur de normes de télévision (35) et comme destination de conversion celles qui sont désignées par ledit premier commutateur d'ordres et, dans l'autre mode, de manière à établir comme source de conversion les normes de télévision désignées par ledit premier commutateur d'ordres (43) et comme destination de conversion celles qui sont désignées par ledit second commutateur d'ordres (44).
16. Magnétoscope selon la revendication 1, dans lequel ledit convertisseur de normes de télévision (5) comprend un convertisseur A/N (14,16) pour convertir un signal vidéo analogique en entrée en un signal numérique, une mémoire (20) pour le signal vidéo correspondant au moins à une trame, un circuit de commande de mémoire (21) pour commander ladite mémoire, un séparateur de synchronisation (18) pour séparer un signal de synchronisation dudit signal vidéo en entrée, un générateur d'horloge d'écriture pour élaborer un signal d'horloge d'écriture à partir d'un signal de sortie dudit séparateur de synchronisation, un générateur d'horloge de lecture (22) pour élaborer un signal d'horloge de lecture afin d'extraire les données mémorisées dans ladite mémoire, et un convertisseur N/A

(23,24) pour reconvertir le signal numérique en un signal analogique.

17. Magnétoscope selon la revendication 16, dans lequel ledit convertisseur A/N convertit séparément un signal de luminance et un signal de différence de couleur du signal vidéo en entrée en des signaux numériques et ledit convertisseur N/A reconvertit lui aussi séparément en signaux analogiques le signal de luminance et le signal de différence de couleur numérisés.
18. Magnétoscope selon la revendication 1, dans lequel ladite mémoire (20) comprend une mémoire de trames à unités d'une trame et une mémoire de lignes à unités d'une trame, et en ce que ladite mémoire de trames est utilisée pour convertir une fréquence de trame par lecture par entrelacement ou chevauchement trame par trame et ladite mémoire de lignes est utilisée pour convertir le nombre de lignes de balayage trame par trame par interpolation.
19. Magnétoscope selon la revendication 1, dans lequel ledit moyen de conversion (5) comprend un décodeur (15) pour l'acquisition d'un signal de différence de couleur à partir d'un signal vidéo en entrée, et un codeur (25) pour l'acquisition d'une sous-porteuse de chrominance désirée à partir du signal de différence de couleur.

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FIG. 1A RECORDING MODE

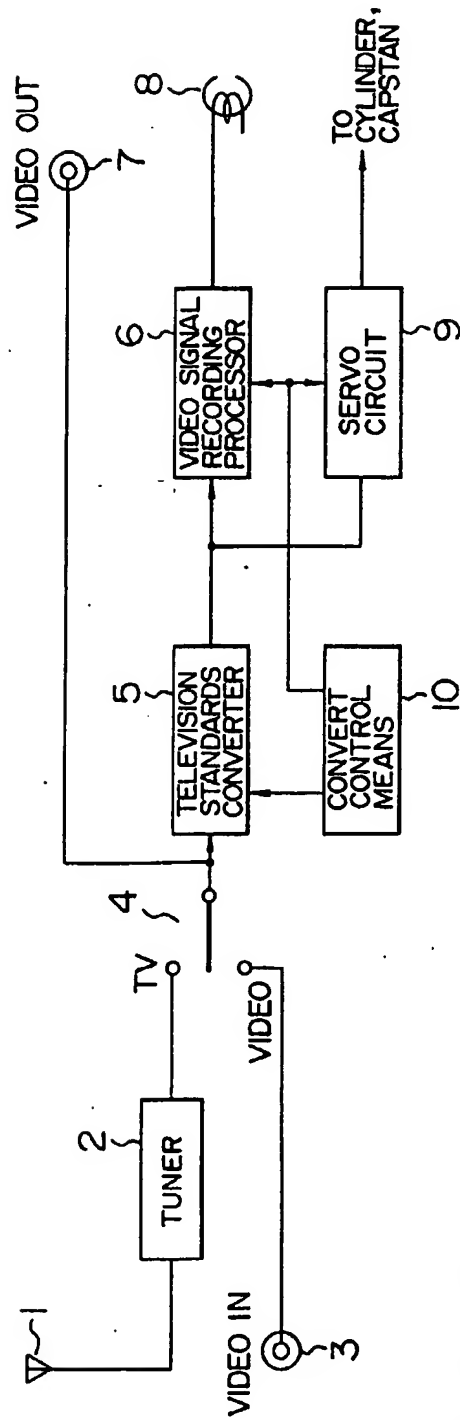
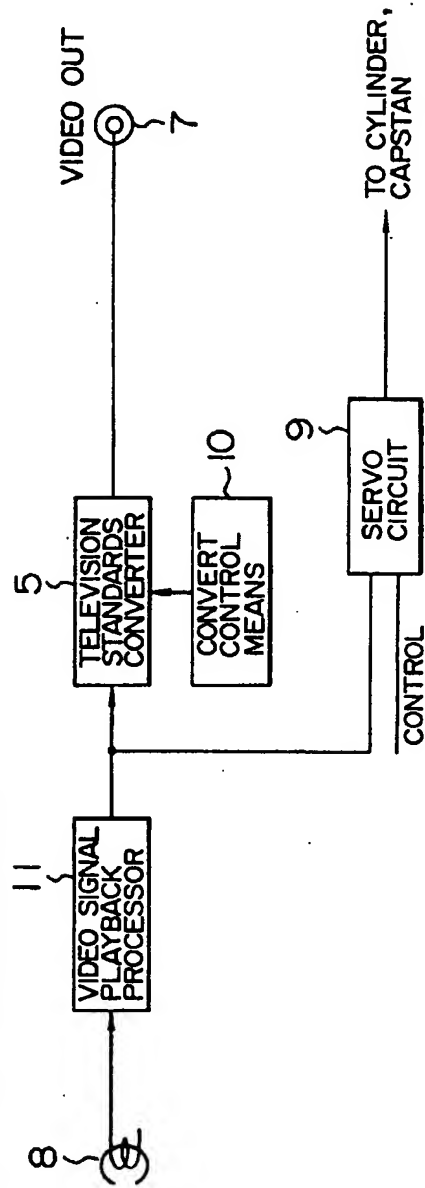
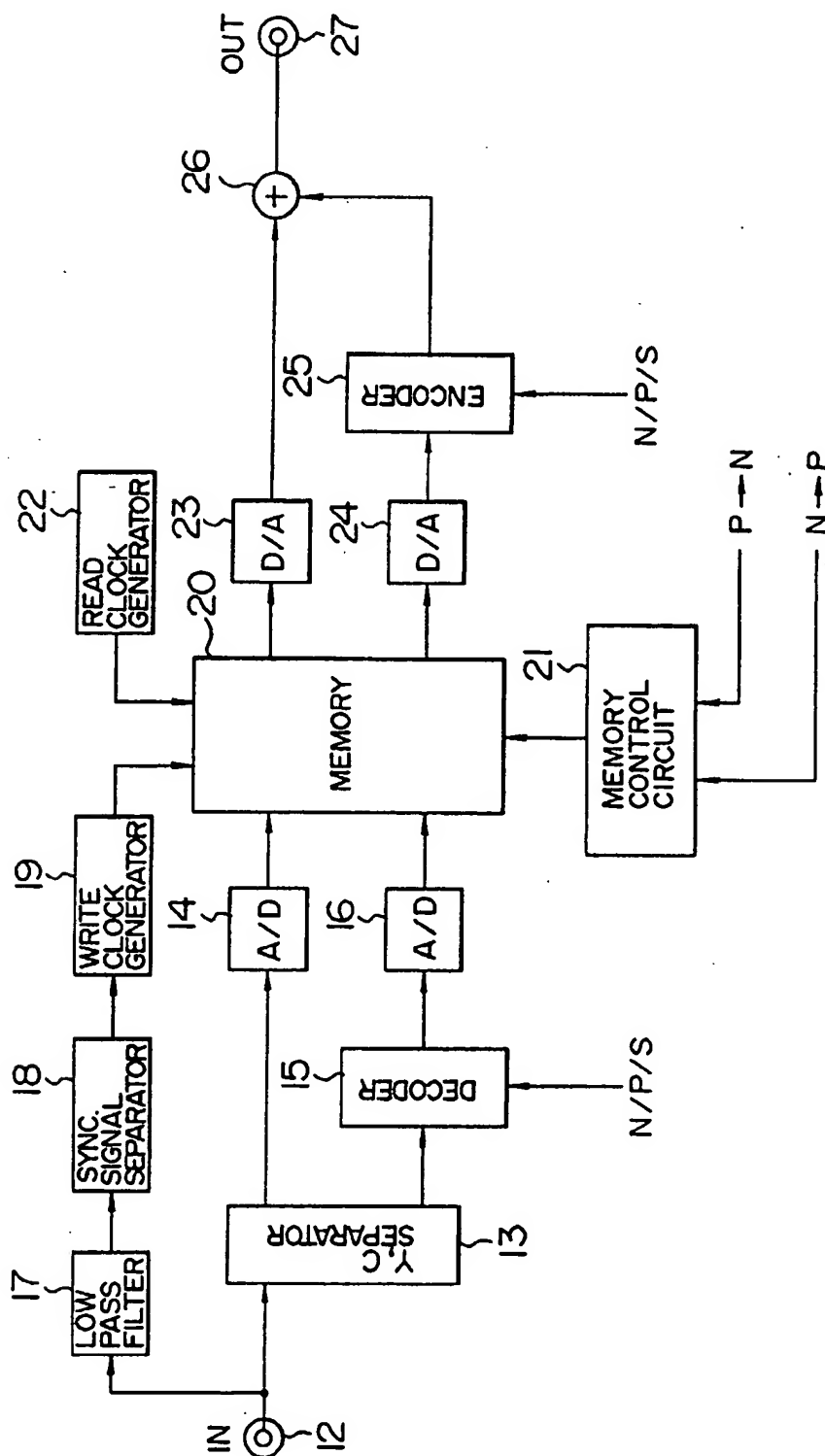


FIG. 1B PLAYBACK MODE



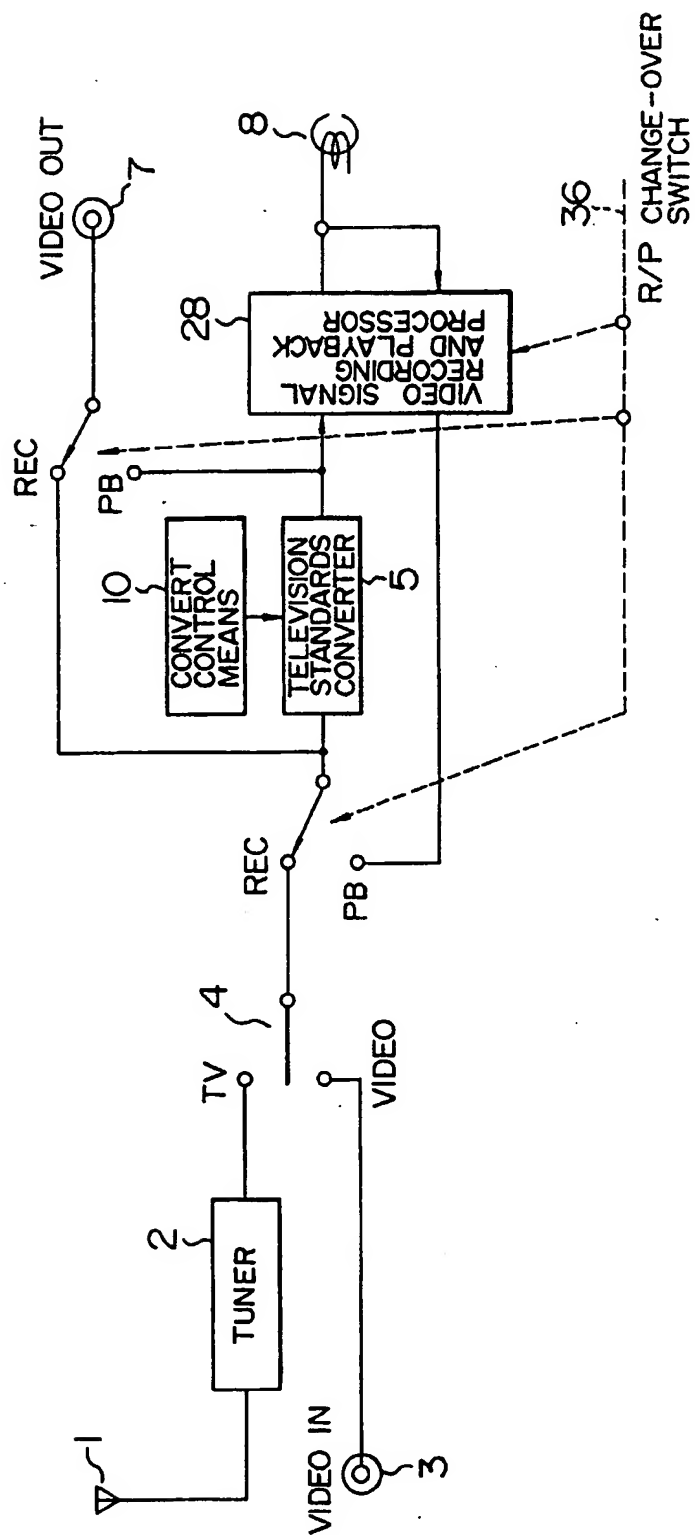
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FIG. 2



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FIG. 3



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FIG. 4A RECORDING MODE

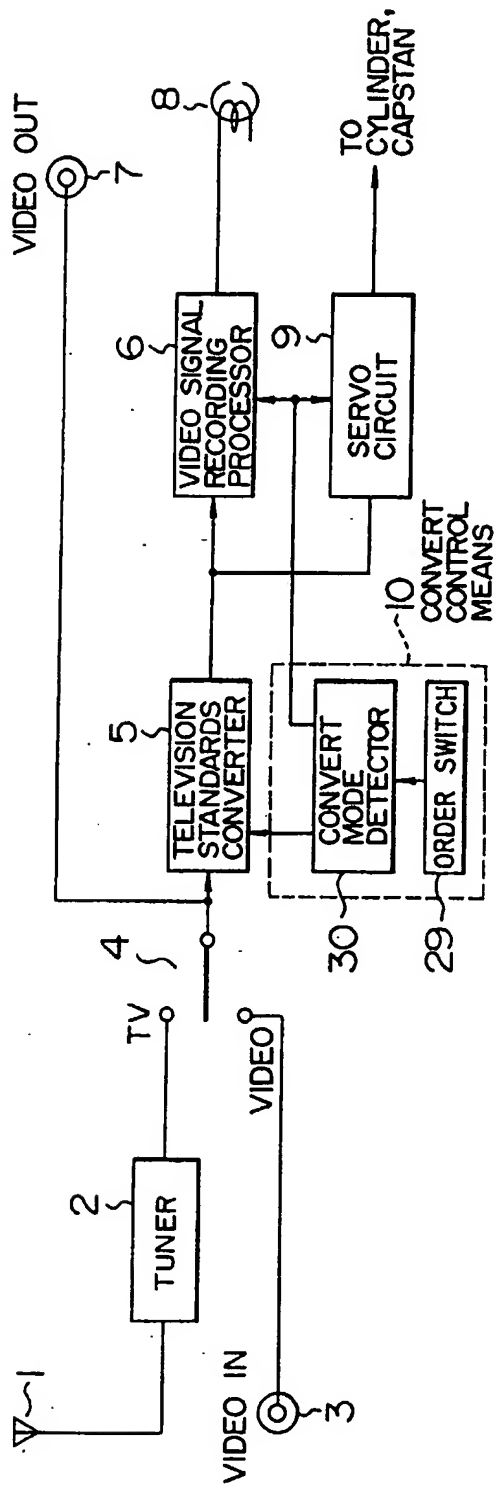
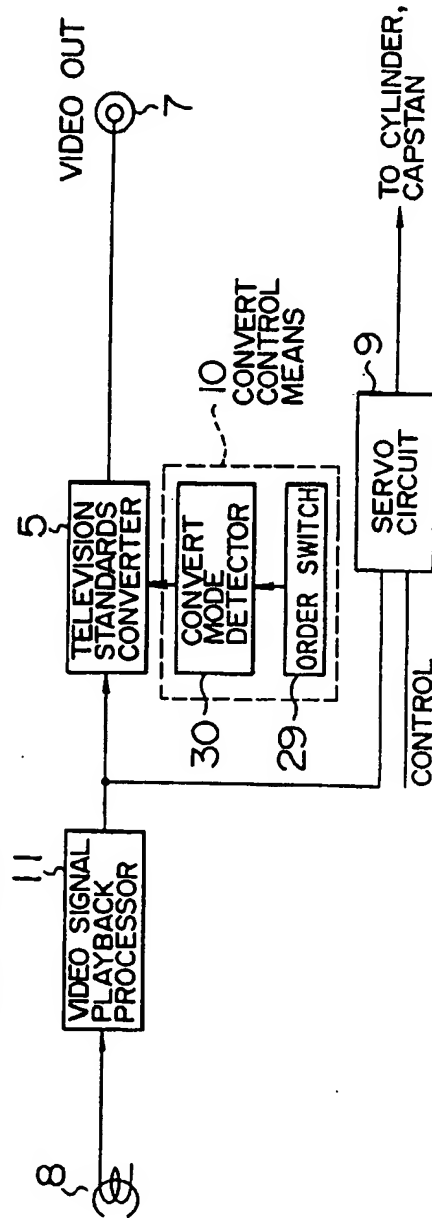
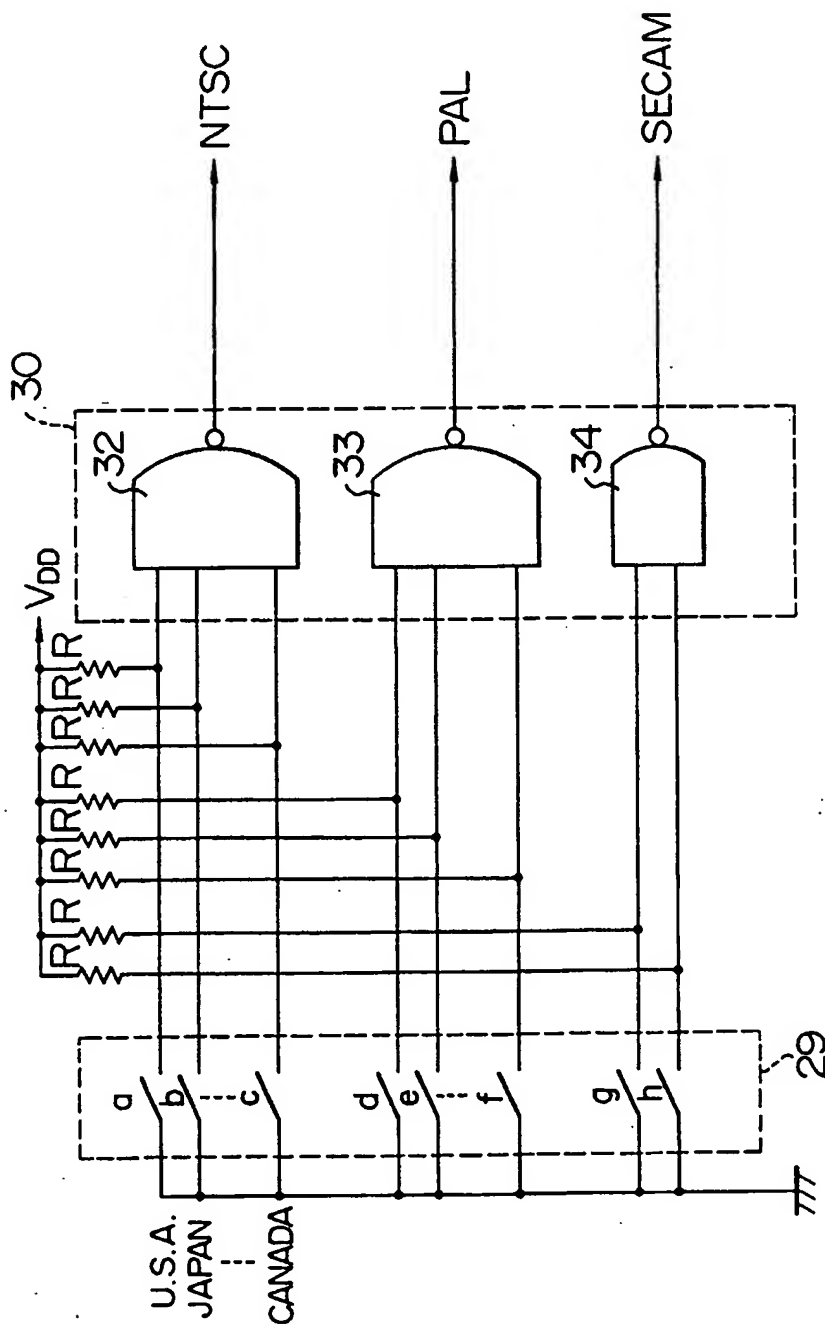


FIG. 4B PLAYBACK MODE



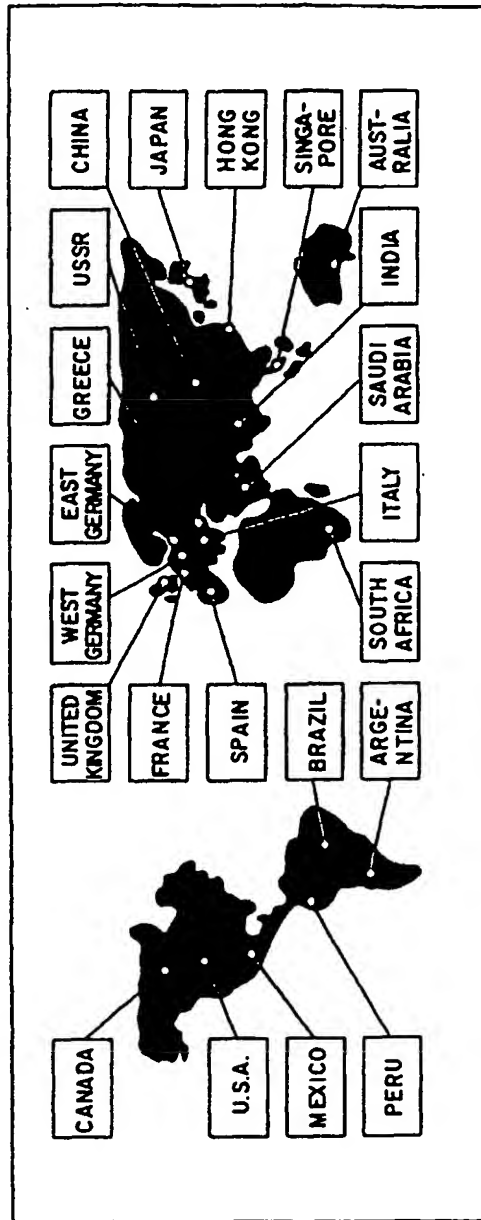
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FIG. 5



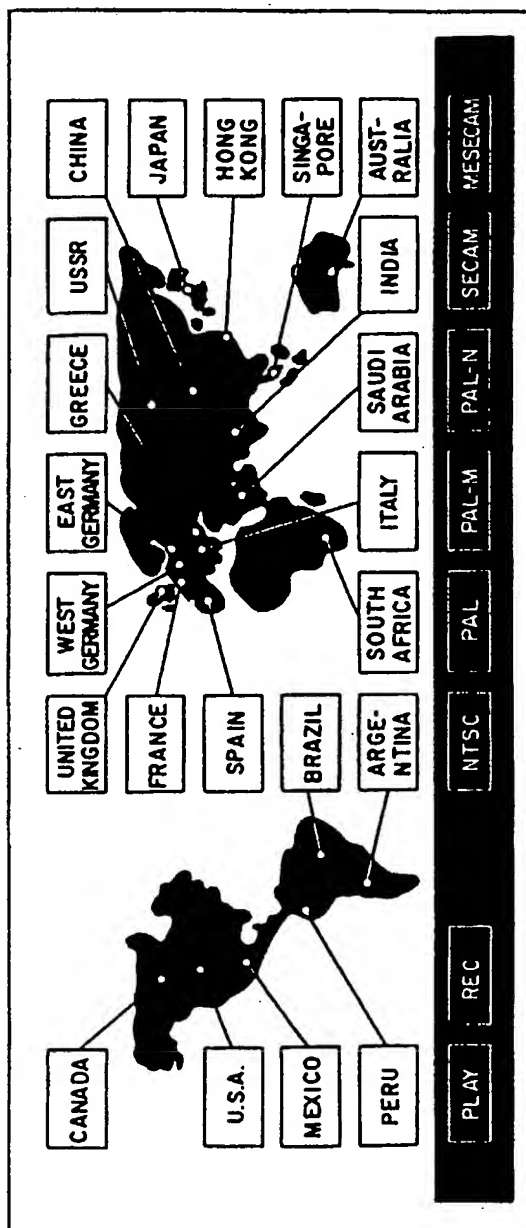
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FIG. 6



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FIG. 7



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FIG. 9A

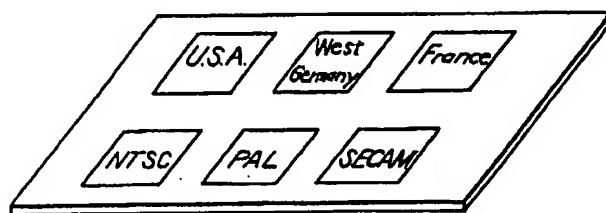


FIG. 9B

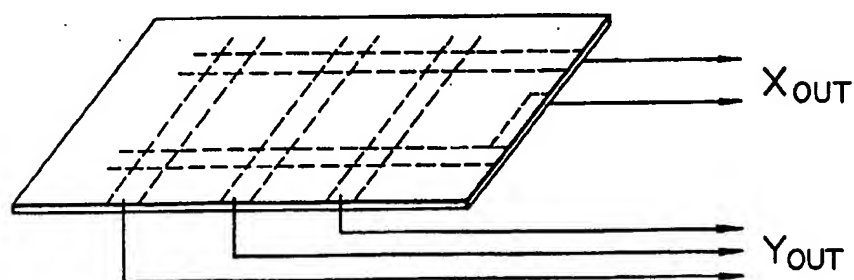
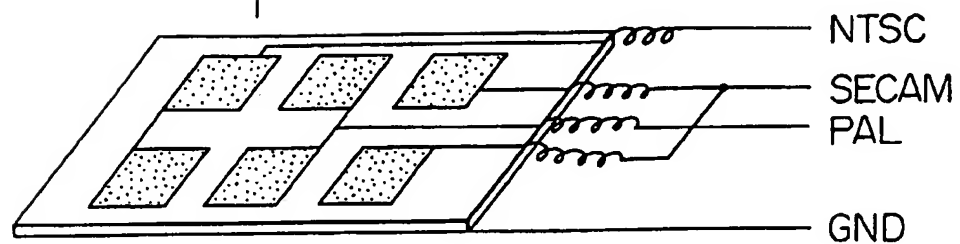


FIG. 9C



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FIG. 10A RECORDING MODE

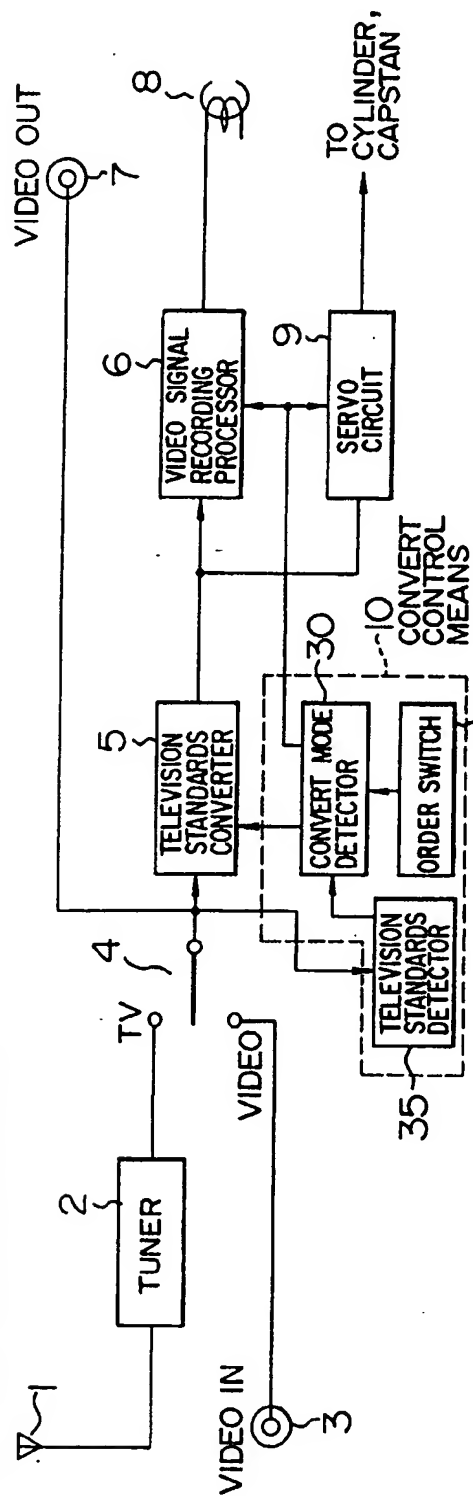
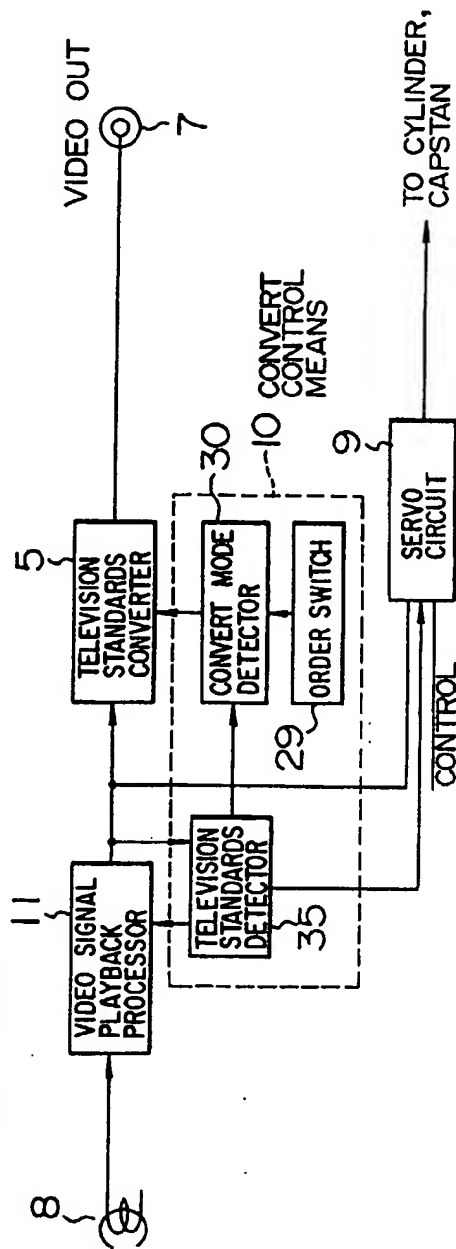
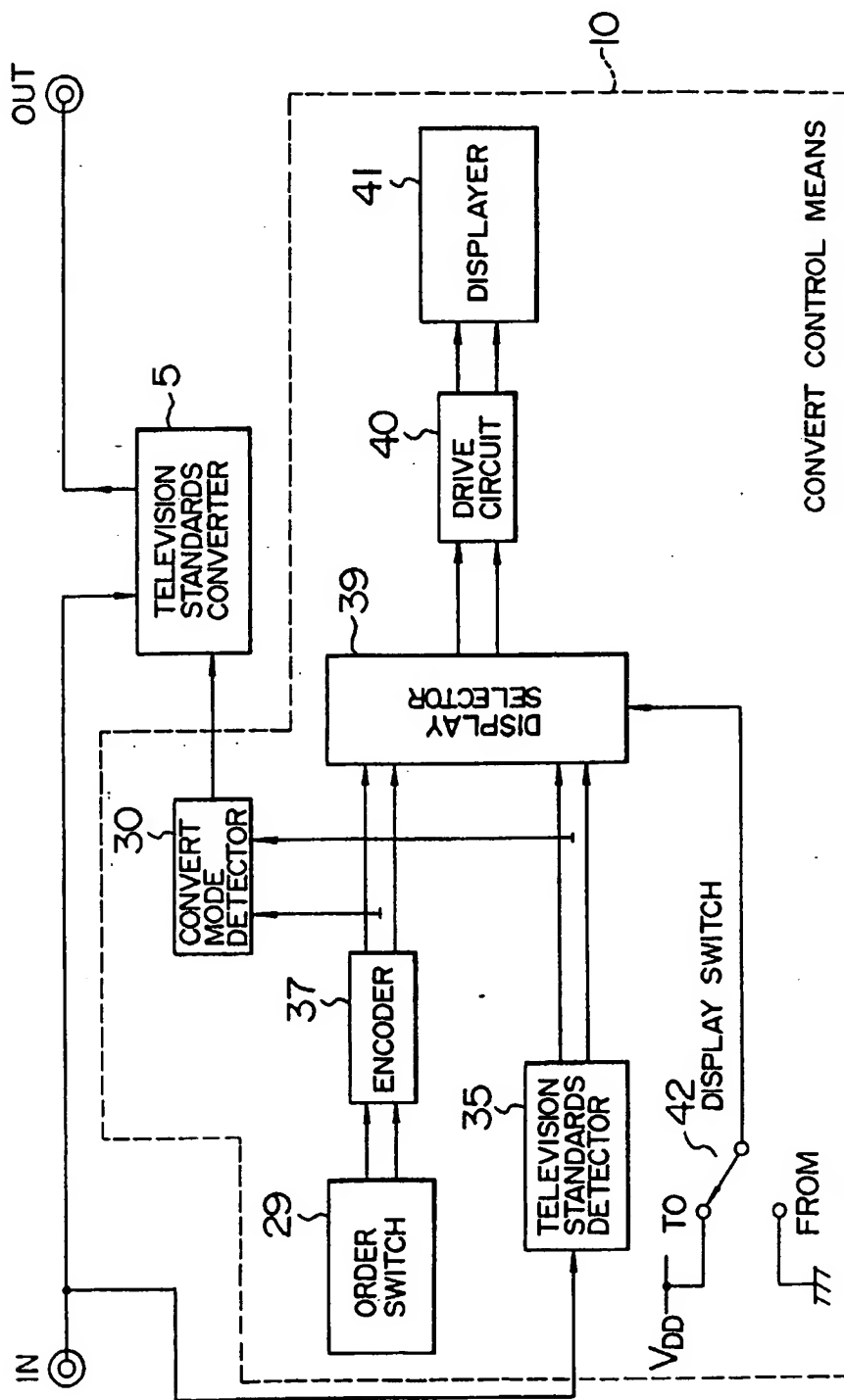


FIG. 10B PLAYBACK MODE



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FIG. 11



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The diagram illustrates a television system architecture. An antenna (1) is connected to a TUNER (2), which is further connected to a switch (4). This switch (4) can route the signal to either a TV (3) or a VIDEO input. The signal path continues through a TELEVISION STANDARDS CONVERTER (5) and a VIDEO SIGNAL RECORDING AND PLAYBACK PROCESSOR (28). A dashed line labeled REC/PB separates the recording and playback sections. A TELEVISION STANDARDS DETECTOR (35) is connected to the converter (5) and the processor (28). A CONVERT MODE DETECTOR (30) is connected to the converter (5) and the processor (28). The CONVERT MODE DETECTOR (30) is connected to a 1ST ORDER SWITCH (43) and a 2ND ORDER SWITCH (44). The 1ST ORDER SWITCH (43) is connected to the TELEVISION STANDARDS DETECTOR (35). The 2ND ORDER SWITCH (44) is connected to the CONVERT MODE DETECTOR (30). The entire system is controlled by CONVERT CONTROL MEANS (10).

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FIG. 13

